

CLAIMS

What is claimed is:

1. An apparatus for processing a first digital signal that is arranged in a digital music
5 format, and includes information including at least the sound from one vocalist and musical
accompaniment, the apparatus comprising:
a source input receptor operable to receive said first digital signal;
a user input receptor operable to receive a user's first microphone input;
a first analog-to-digital converter adapted to operate on said first microphone input and to
10 output a second digital signal;
a first digital processor adapted to operate on said first digital signal to reduce audibility of
said vocalist and to output a first-modified digital signal;
a second digital processor arranged in-circuit as a mixer to combine said second digital
signal and said first-modified digital signal effective to form a left-out channel, and
15 a right-out channel; and
a digital-to-analog converter adapted to operate on said left-out channel and said right-out
channel to form a stereo analog output signal from said apparatus; and
a volume control operable on said stereo analog output signal to effect an audible volume
when said stereo analog output signal is applied to a playback device.
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2. The apparatus of claim 1, further comprising:
a user operable control effective to select a notch frequency range in which reduction of
audibility is performed by said first digital processor.
- 25 3. The apparatus of claim 1, further comprising:
a user operable control effective on said first digital processor to select an amount of
reduction in audibility of said vocalist.

4. An apparatus for processing a first analog signal that carries information including at least the sound from one vocalist and musical accompaniment in a left channel and a right channel, the apparatus comprising:

a source input receptor operable to receive said first analog signal;

5 a user input receptor operable to receive a user's analog input;

a first analog-to-digital converter adapted to operate on said first analog signal and to output a first digital signal;

a first signal processor adapted to operate on said first digital signal effective to output information corresponding at least to left-in, right-in, and center-in channels;

10 a second analog-to-digital converter adapted to operate on said user's analog input and to output a second digital signal;

a second signal processor operable as a reducer and arranged to operate on at least a portion of said center-in channel to reduce audibility of said vocalist and to output a center-out channel;

15 a third signal processor arranged in-circuit as a mixer to combine said second digital signal, said center-out channel, and said left-in channel to form a left-out channel, and to combine said second digital signal, said center-out channel, and said right-in channel to form a right-out channel; and

20 a digital-to-analog converter adapted to operate on said left-out and right-out channels to form a stereo analog output signal from said apparatus.

5. The apparatus of claim 4, wherein:

said first signal processor comprises a digital signal processor adapted to output a signal in a digital music format.

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6. The apparatus of claim 4, wherein:

said apparatus is embodied in a hand-held device adapted to generate one or more outputs.

7. The apparatus of claim 6, further comprising:
expansion structure adapted to receive an add-on card; and
an add-on card structured for reception in said expansion structure and operable to add a
component to an electrical path through said apparatus.

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8. The apparatus of claim 7, wherein:
said add-on card comprises a digital signal processor structured and arranged to reduce
audibility of said singer's voice.

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9. The apparatus of claim 7, wherein:
said add-on card is effective to produce vocal effects in an output.

10. The apparatus of claim 7, wherein:
said add-on card comprises a nonvolatile memory adapted for record and playback of an
output signal.

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11. The apparatus of claim 7, wherein:
said add-on card comprises a plurality of microphone inputs.

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12. The apparatus of claim 7, wherein said add-on card comprises a plurality of
headphone outputs.

13. The apparatus of claim 7, wherein:
said add-on card comprises a display device operable to provide a user with visible
information.

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14. An apparatus for converting a multichannel output signal from a music source, which signal includes an original lead singer's voice and musical accompaniment, into an input that can be applied to a playback device to form audible musical accompaniment for a Karaoke singer, the apparatus comprising:

5 a first connector adapted to receive said output signal as a first apparatus input signal;
a second connector adapted to receive a second apparatus input signal from a user's first microphone;

first circuitry adapted at a first configuration to:

10 compare left channel and right channel information carried by said first apparatus input signal and to extract center channel information from said left channel and said right channel to form a first modified left channel, a center channel, and a first modified right channel;

process said center channel effective to reduce audibility of said original lead singer's voice in a resulting processed signal;

15 mix said second apparatus input signal with said processed signal and said first modified left channel to form a second modified left channel output; and
mix said second apparatus input signal with said processed signal and said first modified right channel to form a second modified right channel output;

an electrical power source adapted to energize said first circuitry;

20 a third connector adapted to transmit an apparatus output signal, comprising said second modified left channel output and said second modified right channel output, to a playback device; and

a volume control operable on said apparatus output signal to effect an audible volume when said apparatus output signal is applied to said playback device.

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15. The apparatus of claim 14, wherein:

said first circuitry comprises an analog vocal fader circuit.

16. The apparatus of claim 14, further comprising a multiway switch comprising:
an off position operable electrically to decouple said power source from said first circuitry;
a play-through position operable to place said first circuitry into a second configuration
operable to permit playback of an apparatus output signal comprising said first input
5 signal; and
a first vocal fade position operable to place said first circuitry into said first position.

17. The apparatus of claim 14, further comprising:
an expansion slot comprising a first electrical contact and a second electrical contact, said
10 expansion slot being disposed in-circuit in said first circuitry operably to interrupt a
signal between said first electrical contact and said second electrical contact and
adapted mechanically and electrically to couple with an add-on card carrying second
circuitry; and further in combination with:
an add-on card configured to pass said signal from said first electrical contact to said second
15 electrical contact by way of an electrically conductive path comprising said second
circuitry.

18. The apparatus of claim 17, wherein:
said add-on card carries said second circuitry comprising a jumper between said first
20 electrical contact and said second electrical contact.

19. The apparatus of claim 17, wherein:
said add-on card carries said second circuitry comprising a digital processor adaptable to
reduce audibility of said original singer's voice.

20. The apparatus of claim 19, wherein:
said digital processor is adapted to operate on data arranged in a conventional digital music
format.

21. The apparatus of claim 17, wherein:
said add-on card comprises second circuitry adapted to produce one or more vocal effects.

22. The apparatus of claim 17, wherein:

5 said add-on card carries second circuitry adapted to record said output signal in a
nonvolatile storage media.

23. The apparatus of claim 17, wherein:

10 said add-on card carries second circuitry comprising a second microphone input to said
first circuitry to permit combination of a plurality of user inputs with said
processed signal.

24. The apparatus of claim 17, in combination with a first headphone and a second
headphone, wherein:

15 said first headphone is connected to said third connector; and
said add-on card carries second circuitry comprising a fourth connector, adapted to
transmit said apparatus output signal, disposed in-circuit with a volume control,
for transmission of said apparatus output signal to said second headphone for
audible playback.

20 25. The apparatus of claim 14, wherein:

said apparatus is embodied in a hand-held device.

26. The apparatus of claim 25, wherein:

25 a size of a height, a width and a thickness of said device is less than about 6 inches, about
4 inches, and about 2 inches, respectively.

27. The apparatus of claim 16, wherein:

said multiway switch further comprises a second vocal fade position operable to
configure said apparatus to produce a first output comprising unmodified
playback from said music source for audible perception by said user, and a second
output comprising said audible musical accompaniment.

28. The apparatus of claim 19, wherein:

said processor is programmable by a user to permit said user to adjust an amount of
decibel suppression applied to said lead singer.

29. The apparatus of claim 19, wherein:

said processor is programmable to permit a user to adjust a range of frequencies over
which decibel suppression is applied to said lead singer.

30. The apparatus of claim 22, wherein:

said nonvolatile storage media is a memory device carried by said card.

31. The apparatus of claim 17, wherein:

said add-on card comprises a connector adapted to interface with a personal computer.

32. A portable apparatus embodied in a hand-held form factor and operable to output an electric signal that is playable through a playback device to create accompaniment for a Karaoke singer, the apparatus comprising:

a housing adapted to hold a motherboard, carrying first circuitry, and a power source

5 adapted to enable operation of said first circuitry, said housing being arranged to provide external access to one or more connectors comprising a first connector configured to transmit an apparatus output signal and a second connector configured to receive a microphone input; and

a volume control operable to change a strength of said apparatus output signal; wherein:

10 said first circuitry is operable to process a music input signal from a music source, said music input signal comprising a lead singer and musical accompaniment, to reduce audible presence, when played through said playback device, of said lead singer in said apparatus output signal.

15 33. The apparatus of claim 32, wherein:
said music source comprise a storage medium carried in said housing.

34. The apparatus of claim 32, wherein:

said apparatus comprises a multiway switch operable on said first circuitry, said switch

20 comprising:

an off position effective electrically to decouple said power source from said first circuitry;

a play-through position effective to place said first circuitry into a second configuration operable to bypass modifications to a presence of lead

25 singer's voice effected by said first circuitry; and

a vocal fade position effective to place said first circuitry in said first position.

35. The apparatus of claim 34, wherein:

said motherboard further comprises an expansion slot disposed in-circuit with said first circuitry and operable to interrupt a signal-carrying path through said first circuit; and in combination with:

5 an add-on card carrying second circuitry and adapted for operable reception in said expansion slot, said add-on card being configured to pass an electrical signal from a first electrical contact of said expansion slot to a second electrical contact of said expansion slot by way of an extension path comprising said second circuitry.

10 36. The apparatus of claim 35, wherein:

said add-on card carries said second circuitry comprising a jumper between said first electrical contact and said second electrical contact.

37. The apparatus of claim 35, wherein:

15 said add-on card carries said second circuitry comprising a digital processor adaptable to reduce audibility of said original singer's voice.

38. The apparatus of claim 35, wherein:

20 said add-on card carries second circuitry adapted to record said output signal in a nonvolatile storage media.

39. The apparatus of claim 35, wherein:

25 said add-on card carries second circuitry comprising a second microphone input to said first circuitry to permit combination of a plurality of user inputs with said processed signal.

40. A method for converting an output from a conventional multichannel music source, which output carries information including an original lead singer's voice and musical accompaniment, into substantially real-time musical accompaniment for a Karaoke singer, the process comprising the steps of:

- 5 a) providing a Karaoke ripping device;
- b) inputting said output from said music source as a first input signal to said device;
- c) comparing left channel and right channel information carried by said first input
signal to determine a center channel;
- d) extracting said center channel from said left channel and said right channel to
10 form a center channel, a modified left channel, and a modified right
channel;
- e) processing said center channel to reduce audible presence of said original singer's
voice in a processed signal; and
- f) outputting a combination of said modified left channel, said modified right
15 channel, and said processed signal as an output signal.